REMARKS

In the Office Action, claim 4 was objected to. Claims 1-3 and 12-13 were rejected under 35 USC §103(a) as being unpatentable over Obata et al in view of Riesing. Claims 2-16 were rejected under 35 USC §103(a) as being unpatentable over Obata and Riesing and further in view of Holzer.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version With Markings To Show Changes Made".

In the Office Action, the Examiner states that the Obata et al patent (U.S. Patent No. 5,860,656) discloses a lip-type high pressure seal comprising an annular metallic casing (19), an annular sealing lip secured to the casing (9), the sealing lip made of a highly gas barrier, non-elastomeric, polymer material, and a secondary sealing lip (10). However, the reference number for the first sealing lip is 10. Further, the first sealing lip (10) of Obata is not made of a highly gas barrier, non-elastomeric, polymer material.

In fact, the first sealing lip 10 of Obata is composed mainly of a hydrogenated acrylonitrile-butadiene rubber (col. 4, lines 1-14). Obata also describes that the sealing element 7 including the first sealing lip 10 is formed of an elastic rubber material (col. 6, lines 21-26).

Hydrogenated acrylonitrile-butadiene rubber (HNBR) is an elastomeric or rubber material and has a relatively high gas permeability. Enclosed herewith are copies of Figure 4 of the application in which the gas permeability coefficient of hydrogenated acrylonitrile-butadiene rubber (HNBR) is plotted in red. It will be understood from the graph that hydrogenated acrylonitrile-butadiene rubber (HNBR) has a high gas permeability as compared with polyamide (Nylon). Therefore, the sealing element of Obata is not suitable for sealing a gas under an extremely high pressure prevailing in a refrigerating system wherein carbon dioxide gas is used as a refrigerant.

Based on the foregoing amendments and remarks, it is respectfully submitted that the claims in the present application, as they now stand, patentably distinguish over the references cited and applied by the Examiner and are, therefore, in condition for allowance. A Notice of Allowance is in order, and such favorable action and reconsideration are respectfully requested.

However, if after reviewing the above amendments and remarks, the Examiner has any questions or comments, he is cordially invited to contact the undersigned attorneys.

Respectfully submitted,

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JLS/dmt

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

Please amend the Abstract of the Disclosure as follows:

-- A high pressure shaft seal ~~(10A)~~ for use in a refrigerating machine wherein carbon dioxide is used as a refrigerant in lieu of "Freon". The sal has a sealing lip ~~(24A)~~ made of a non-elastomeric polymer material such as nylon that has a small gas permeability coefficient, a region of the sealing lip brought into contact with a shaft to be sealed being lined with a low friction lining ~~(26A)~~ of polytetrafluoroethylene. The gas barrier sealing lip ~~(24A)~~ of nylon serves to effectively block permeation of carbon dioxide gas under an extremely high pressure of from about 4 Mpa to about 12 Mpa. The sealing lip ~~(24A)~~ of nylon has a relatively high rigidity but is nevertheless able to resiliently undergo elastic deformation when such a high pressure is applied, to thereby resiliently follow any shaft run-out to exhibit sufficient dynamic and static sealing functions. --

IN THE CLAIMS:

Please amend claims 1 and 4 as follows:

1. (Amended) A lip-type high pressure seal comprising an annular metallic casing, an annular sealing lip secured to said casing, and a low friction lining bonded to said sealing lip, ~~characterized in that~~ said sealing lip ~~is~~ being made of a ~~highly~~ high gas barrier, non-elastomeric, polymer material.

4. (Amended) A lip-type seal according to claim 1, wherein said ~~dealing~~ sealing lip is made of polyamide.